

Yoshiharu KUWABARA*: On the shape and the direction
of leaves of grass seedlings

桑 原 義 晴*: イネ科幼苗の形態と葉の開出の方向について

The writer already published the systematic significance of the first leaf in this Journal 35: 139-145 (May 1960). In this paper the subsequent result obtained thereafter is given. Up to now the seedlings of 57 grass species were observed by myself. Tab. 1 shows the summary of my additional observations.

1) According to Avdulev (1931), the first seedling leaf of grasses can be divided into 2 distinct types, but the writer concludes that the first seedling leaf of grasses is divided into 3 types according to the direction and the shape of the leaf.

- (1) Perpendicular type (type I—Fig. 1. A—a, c)
- (2) Ascendant type (type II—Fig. 1. B—e, g)
- (3) Horizontal type (type III—Fig. 1. C—i)

Type I, the first seedling leaf standing perpendicularly, and the leaf mostly linear or narrowly linear, leaf apex acute (Fig. 1. A-1, 2), the length/width ratio mostly 15.0-35.0, and the value of the first leaf ratio is the largest, but, as to the second or third, it gradually tends to be smaller (Fig. 2), example: Pooideae.

Type II, the first seedling leaf inclines almost ascendently, the leaf mostly linear or oblong-lanceolate, leaf apex acute or obtuse (Fig. 1. B-3, 4), the length/width ratio mostly 3.5-15.0, and the value of the first leaf ratio is the smallest, but, as to the second or third, it tends to be larger and larger (Fig. 3, 4), example: Arundoideae—*Glyceria*, Eragrostoideae—*Eragrostis*, *Muehlenbergia*, Panicoideae—*Setaria*, *Paspalum*.

Type III, the first seedling leaf grows almost horizontally, the leaf mostly oval to round-oval, leaf apex obtuse or rounded (Fig. 1. C-5), the length / width ratio mostly 1.3-2.2, and the difference of the ratio value between the first leaf and the above second is not seen remarkably (Fig. 5), example: Panicoideae—*Arthraxon*, *Microstegium*.

As described above, the shape and the direction of the first seedling leaf are useful features as the characteristics of systematic grouping of grasses. But looking into various kinds, considerable exceptions are seen. As already reported, the 3

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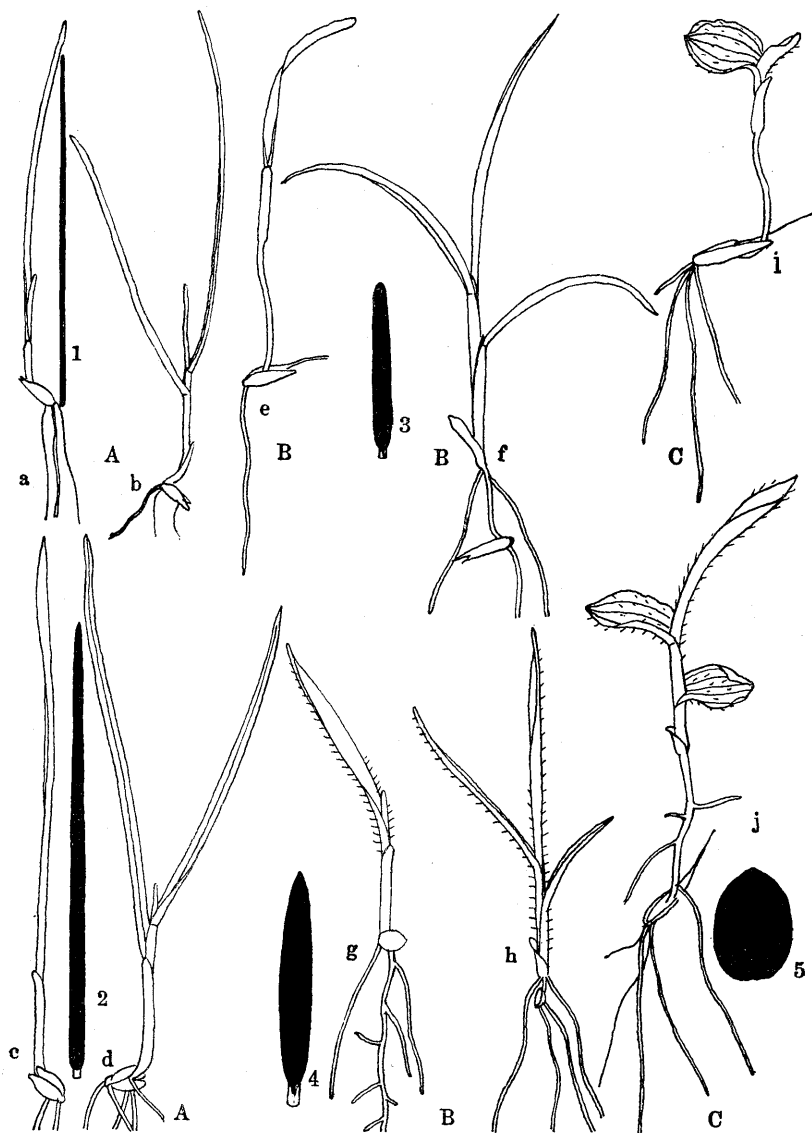


Fig. 1. The shape and the direction of leaves. a, c. Perpendicular type. e, g. Ascendant type. i. Horizontal type. a, b. *Festuca elatior* Linn. c, d. *Pharus canariensis* Linn. e, f. *Muehlenbergia longistolon* Ohwi. g, h. *Paspalum thunbergii* Kunth. i, j. *Microstegium vimineum* A. Camus var. *polystachyum* Ohwi. 1-5. The shape of leaves of each type.

types do not always agree with the systematic groups. The seedlings of Arundoideae resemble Eragrostoideae, but the first seedling leaf is linear and leaf apex acute or obtuse, the length / width ratio mostly 15.0-25.0. Still more, in the succession of the seedling leaf the interesting characteristic is seen. For example, the second leaf of *Bromus* or *Elymus* is suppressed until full development of the first seedling leaf. On the contrary, that of *Setaria* appears before the first seedling leaf is mature.

2) In 2-5-leveled seedlings, there are also 3 types according to the leaf shape and the direction.

(1) The leaf ascendant, and grows almost aslant straightly (type I—Fig. 1. A-b, d, B-h), example: Pooideae—*Festuca*, *Bromus*, *Elymus*, *Beckmannia*, *Halaris*, *Anthoxanthum*, Panicoideae—*Paspalum*.

(2) The leaf ascendant, but curves toward the outer side (type II—Fig. 1. B-f), example: Arundoideae—*Glyceria*, Eragrostoideae—*Eragrostis*, *Muehlenbergia*, Panicoideae—*Setaria*.

(3) The leaf grows almost horizontally (type III—Fig. 1. C-j), example: Panicoideae—*Panicum*, *Digitaria*, *Arthraxon*, *Microstegium*.

As described above, the relationship between the systematic groups and the types of the 2-5-leaved seedling leaf is not seen so close as that of the first seedling leaf. Especially the 2-5-leaved seedlings of Type II include many systematic groups. However, type I is seen mostly in Pooideae, and type III in Panicoideae. Generally speaking, the type I, II, III of the first seedling leaf mostly tends to move to the type I, II, III of the first seedling leaf respectively. These features can be adopted as the characteristics of species or genera.

3) Fig. 2-5 shows the relationship of the increasing length and width of the successive leaves in 4 species of grasses. These curves also represent the characteristics of species or genera.

Literature cited

I. G.L. Stebbins and B. Crampton: Outline for a new system of classification of the Gramineae. (1959).

摘 要

イネ科植物の幼苗第1葉の分類学的特徴は、葉の形態・長さとの比・葉の先端・葉脈の数・色・毛の有無などに現われているが、また、葉の開出の状態にもその特徴がみ

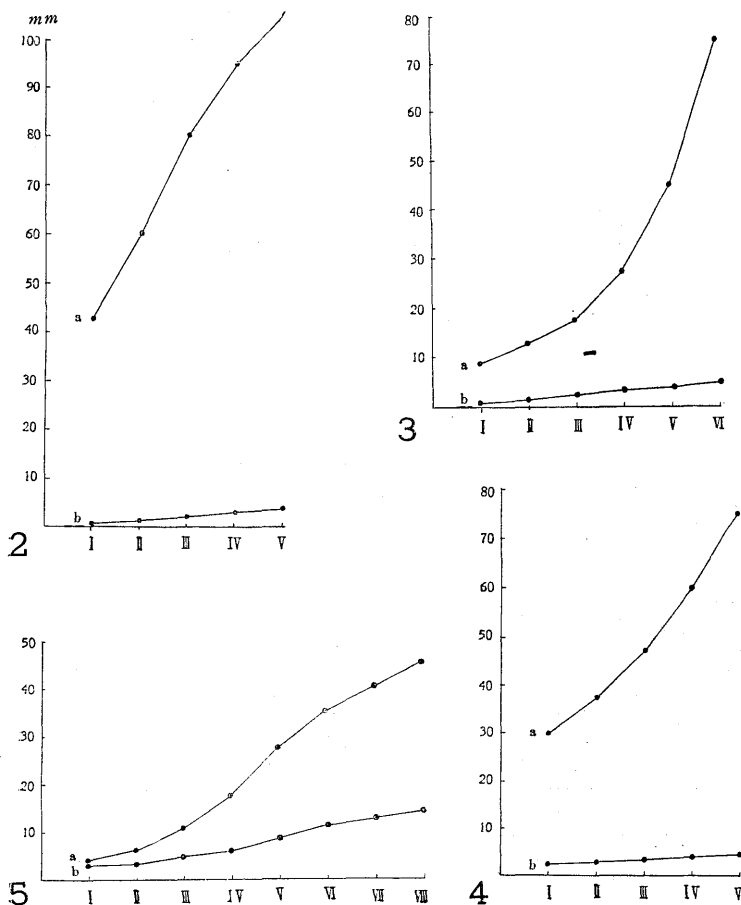


Fig. 2-5. The length (a) and the width (b) of leaves (I, II...indicate the leaf number) in 4 species. 2. *Festuca elatior* 3. *Eragrostis ferruginea*. 4. *Paspalum thunbergii* 5. *Microstegium japonicum*.

The length / width ratios of them are follows :

Species	I	II	III	IV	V	VI	VII	VIII
2	106.5	44.4	40.0	31.7	31.3			
3	11.3	10.0	7.0	8.3	11.3	15.0		
4	12.0	13.4	14.6	16.2	16.7			
5	1.5	1.9	2.2	2.9	3.2	3.2	3.2	3.2

Tab. 1. The features of the first seedling leaf.

Species	shape	leaf apex	length (mm)	width (mm)	length width	direction
Pharodoideae						
<i>Zizania latifolia</i> Turcz.	lanceolate	acute	3.0- 4.0	1.0	3.5	a.
Arundoideae						
<i>Achnatherum pekinense</i> Ohwi	linear	acute	40.0- 48.0	1.0 1.3	38.3	p.
<i>Glyceria ischyronura</i>	linear	acute	10.0- 15.0	0.7- 0.9	15.6	a.
<i>G. viridis</i> Honda	linear	acute	15.0 25.0	0.8- 1.0	22.2	a.
<i>G. leptolepis</i> Ohwi	linear	acute	10.0- 15.0	0.6- 0.8	17.9	a.
<i>G. alnasteretum</i> Komar.	linear	acute	10.0- 13.0	1.0- 1.1	10.9	a.
Pooideae						
<i>Festuca rubra</i> L. var. <i>rubra</i> (Linn.)	linear	acute	15.0- 22.0	0.5- 0.6	33.6	p.
<i>Bromus mollis</i> Linn.	linear	obtuse	30.0- 40.0	1.0	35.0	p.
<i>Agropyron tsukushiense</i> Ohwi var. <i>transiens</i> Ohwi	linear	acute	25.0	1.0	25.0	p.
<i>Elymus mollis</i> Trin.	linear	acute	45.0- 70.0	1.8- 2.0	30.0	p.
<i>E. dahuricus</i> Turcz	linear	acute	40.0- 50.0	1.5 1.8	27.2	p.
<i>Avena sativa</i> Linn.	linear	obtuse	45.0- 70.0	3.5- 4.5	14.4	p.
<i>Phalaris canariensis</i> Linn.	linear	acuminate	55.0- 75.0	1.8- 2.0	34.2	p.
<i>P. arundinacea</i> Linn	linear	acuminate	18.0- 25.0	1.0- 1.2	19.5	a.
<i>Agrostis hiemalis</i> Britt.	linear	acute	10.0- 13.0	0.2	57.5	p.
Eragrostoideae						
<i>Eragrostis ferruginea</i> P. Beauv.	linear	acute	6.0- 12.0	0.5- 1.0	12.0	a.
<i>Cleistogenes hackelii</i> Honda	linear	acute	3.0- 5.0	1.0- 1.2	3.6	a.
<i>Sporoborus elongatus</i> R. Br.	linear	acute	8.0- 15.0	0.6- 0.9	15.3	a.
<i>Muehlenbergia longistolon</i> Ohwi	oblanceolate	obtuse	10.0- 15.0	0.8- 1.1	13.2	a.
Panicoideae						
<i>Pennisetum alopecuroides</i> Spreng.	linear	acute	12.0- 17.0	2.0	7.3	p.
<i>Microstegium vimineum</i> A. Camus var. <i>polystachyum</i> Ohwi	round- oval	round- ed	5.5- 8.5	4.0- 5.0	1.6	h.
<i>M. japonicum</i> Koidz.	round- oval	round- ed	4.5- 5.0	3.0- 3.5	1.5	h.

p: perpendicular.

a: ascendant.

h: horizontal.

られる。すなわち、第1葉が地表に対して垂直に開出する型(第I型)ーイチゴツナギ亜科の大部分、斜方に開出する型(第II型)ースズメガヤ亜科の大部分とキビ亜科の一部、水平に開出する型(第III型)ーキビ亜科のキビ属・メヒシバ属・コブナグサ属・アシボソ属など、の三つの型が識別されるが、これらの型はそれぞれ亜科あるいは属の特徴を示している。

また、2-5 葉開出した幼苗の型と分類群との関係は、第1葉の型ほど明瞭ではないが、つぎのような関係がみられる。いま、幼苗の葉が斜上にまっすぐ開く型を第I型、葉は斜上に開くが、葉端が外方に彎曲する型を第II型、側方・水平に開く型を第III型とすると、第II型には、ダンチク亜科のドジョウツナギ属・スズメガヤ亜科のスズメガヤ属・ネズミガヤ属・キビ亜科のエノコログサ属などの分類群がこれに含まれる。しかし、概してI型はイチゴツナギ亜科の大部分に、また、第III型はキビ亜科の諸属にみられる。したがって、第I葉の型Iの大部分は幼苗の型Iに、第I葉の型IIは幼苗の型IIに、また、第I葉の型IIIは幼苗の型IIIに、それぞれ移行する傾向がある。上述の如く、第2-5 葉開出した幼苗の形質も分類群の特徴として、ある程度とりあげることができる。

つぎに、葉の伸長と、幅の増加との関係を見ると、第1葉から第2葉、第3葉と次第に成葉になるにしたがって、葉の伸長より幅の増加の方がいちじるしく発達するもの(例、ヒロハノウシノケグサ)、葉の伸長の方が幅の増加よりいちじるしく発達するもの(例、カゼクサ・スズメノヒエ)、葉の伸長と、幅の増加とがほぼ平行に発達し、葉の長さとの比にいちじるしい変化のないもの(例、アシボソ・ササガヤ)など、種あるいは属によって、それぞれ定まった特徴が現われている。

○ タチツボスミレの一品 (檜山庫三) Kozo HIYAMA: A new form of *Viola grypoceras* A. Gray.

ケタツボスミレにも、アカフタチツボスミレのように、葉面に暗紫色の斑の入ったものがある。1961年6月4日、群馬県甘楽郡西牧村神津牧場で小林純子氏の採集品である。かつて、私も、これを武州御岳で採集して、マダラケタツボスミレと仮称しておいたが、標本を紛失して、そのままとなっていたものである。

Viola grypoceras A. Gray var. *grypoceras* forma **sordida** Hiyama, nov. f.

Folia supra praesertim ad nervos sordide violaceo-maculata. Cetera ut in f. *pubescenta*.—Nom. Jap. Madaraketachitsubsumire.

Hab. Hondo: Kozu Pasture, Prov. Kozuke (S. Kobayashi, June 4, 1961—type in Makino Herbarium).

□佐州藤右衛門篇 大井次三郎監修: 桜 光村書院 36cm 版, pp. 270, 貼込色摺版 101, 和英両文 (10 IV 1961) ￥15,000 本書はサクラことにヤマザクラ系のものの品種を写生した着色の豪華版で、各図は頁ごとに貼りつけてあり、いちいち大井博士が考定して学名が与えられている。恐らくサクラに興味ある人士には不可欠のものの一つであろう。(久内清孝)